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01 The ABB Megaflex DPA UPS. Here, a 1.5 MW configuration is shown.



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MEGAFLEX – AN EFFICIENT AND RESILIENT UPS FOR HIGH-POWER DATA CENTERS

ABB's new MegaFlex uninterruptible power supply (UPS) is aimed at applications such as data centers that have high power demands. MegaFlex is simple, compact and resilient – and delivers the excellent availability, reliability and efficiency that is a hallmark of all ABB's power protection products.

The quantity of data added to data centers around the globe each minute of every day is staggering. This deluge of data has to be stored in a safe and rapid way and has to be retrievable just as quickly – 24/7 and 365 days a year – so it

center concept often cannot provide the replication, data traffic, reliability and resiliency capabilities demanded by some customers.

Data center requirements

Data center operators have many requirements in common, the most important being:

- Business continuity and zero downtime: All systems have to be always up and running – and whatever happens on the infrastructure side, load-drops are not an option. This is to guarantee safe data transaction, storage and recovery. It is not uncommon for data center outages to cost tens to hundreds of thousands of dollars, and cases that incur costs in the tens of millions of dollars are no rarity.
- Reduction of investment and operating costs through higher energy efficiency: Better efficiency not only reduces energy losses and operational costs but also eliminates the capital investment that would be needed to purchase higher-performance temperature-conditioning systems. Such investments profoundly impact upfront investment.

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Growth in the number and size of data centers is accompanied by a move to cloud-based, hybrid and distributed data centers.



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can be utilized in one of the many applications upon which day-to-day life depends. The dawning of this new era is the reason why data centers are proliferating around the world. Growth in the sheer number and size of data centers is accompanied by another trend: a move toward a sophisticated world of cloud-based, hybrid and distributed data centers. The single, standalone data

A data center has to store data in a completely safe and reliable way. For this reason, the ability to provide an unbroken supply of good-quality power to the data center is critical. Indeed, when they do occur, the most common cause of outages in data centers is a power supply problem.

ABB is a market leader in the UPS technology that ensures power keeps flowing no matter what. The company has pioneered many advanced concepts in modern UPS design – for example, distributed parallel architecture (DPA™).

DPA has worked well for ABB: Users whose power requirements increase can simply add modules to reach power capacities of several MW. However, as larger data centers drive UPS power requirements ever higher – to 30 or 40 MW – the need has emerged for a UPS that has a base power level of at least 1 MW and that can be expanded or configured to cater for applications requiring up to 6 MW. Five such installations can cover the energy needs of a 30 MW site.

Further, as data centers evolve into larger facilities that are denser, scalable, more networked and more converged, operational costs can

— Customers seek a power distribution solution that is highly efficient, scalable, flexible and easy to install and maintain.

increase. An appropriate choice of UPS and associated power infrastructure helps control these costs.

Other considerations involve the move away from the standalone data center toward geographically distributed facilities, global traffic management, critical data replication, virtual storage, cloud computing and other complicating factors. This evolution places new demands on resiliency, provokes new thinking and, most importantly, motivates customers to look for a power distribution solution that is highly efficient, scalable, flexible and easy to install and maintain.

To satisfy these evolving customer demands, ABB has developed the MegaFlex UPS for the UL and IEC markets →01.



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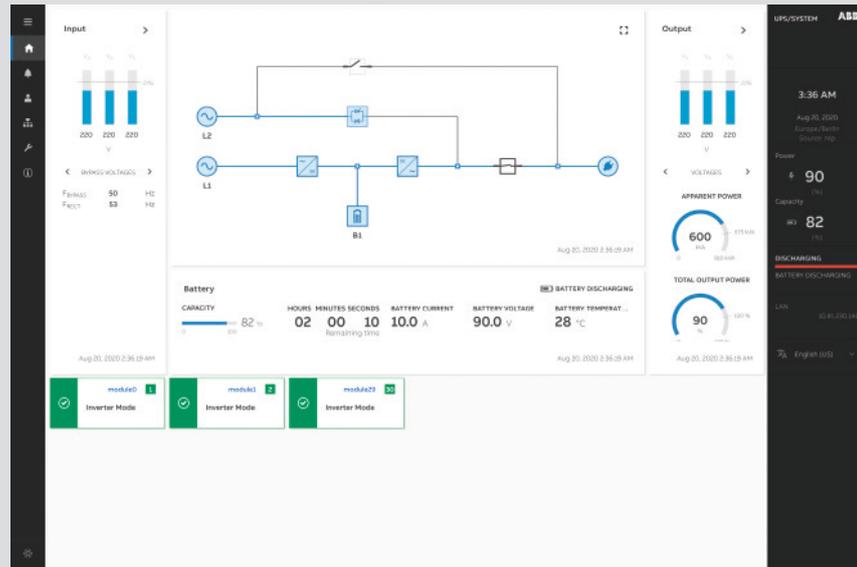
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02 Space in data centers is usually limited, so the flexibility of the Megaflex DPA UPS is valuable when it comes to layout.

02a 1,000 kW, system with four power modules, connection frame on left.

02b 1,000 kW, system with four power modules, connection frame on right.

02c 1,500 kW, six-power-module system with connection frame in center.

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03 Compared to an ABB DPA 500 UPS solution, the Megaflex DPA has a footprint around 45 percent smaller.

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04 The operator has a comprehensive overview via a HMI but can also access the same information via a Web page.

ABB's MegaFlex DPA IEC UPS

The MegaFlex DPA design brief included the following basic tenets:

- Develop, manufacture and sell a high-efficiency UPS with a rated power of 1 MW, 1.25 MW, or 1.5 MW that is suitable for large data center facilities.
- Standardize power distribution architectures in compliance with the Uptime Institute classification system and EN 50600.
- The UPS must be compact, highly energy-efficient, flexible, easy to install and maintenance needs must be predictable.

The result was a transformer-less UPS consisting of 250 kW power blocks, a central static bypass with a rated power of 1,000 kW or 1,500 kW and an I/O connection frame with power ratings of 1 MW and 1.5 MW. The input feed can be single or dual (option). The MegaFlex DPA UPS can use lithium-ion or valve-regulated lead-acid (VRLA) batteries as external storage. Backfeed protection is provided as

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An option provides redundant power capacity of 1,000 kW N+1 or 1250 kW N+1.

standard. An option provides redundant power capacity: 1,000 kW N+1 or 1,250 kW N+1. A product variant – which will be released first – features distributed bypass switches, resulting in a smaller footprint.

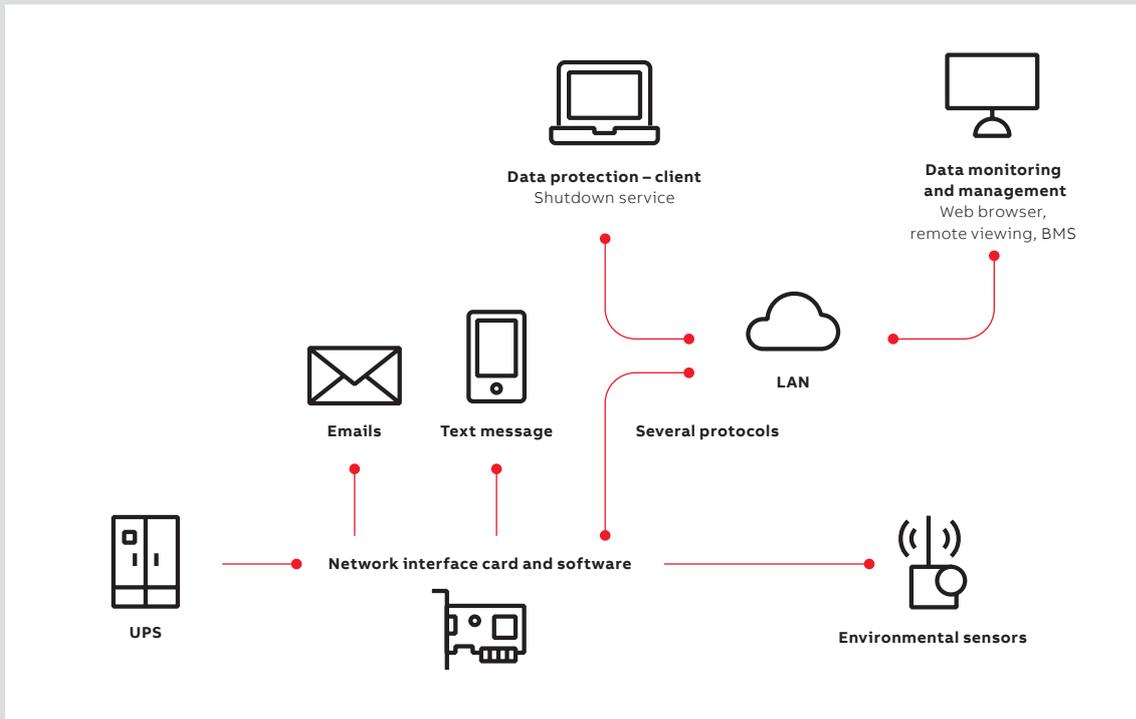
Further salient MegaFlex DPA features include:

- High-efficiency converters – in VFI mode (see below) > 97.4 percent.
- Optimized footprint and flexibility in component layout →02–03.
- Simple, safe and quick installation with high adaptability to the building infrastructure.
- Enhanced power measurement that provides comprehensive information to the data center operator so that energy consumption can be tracked.
- Intelligent predictive maintenance program to plan and reduce maintenance throughout the product life.
- Enhanced self-diagnostics to minimize human intervention during maintenance and start-up.
- Full lifetime service provision via local ABB-trained specialists.

Intelligent energy management

Due to the vast amount of energy large data centers consume, energy efficiency is a particularly important topic. Every percentage point improvement in efficiency brings with it significant cost savings. The default operating mode for the MegaFlex DPA is voltage- and frequency-independent (VFI) double conversion mode, which has an efficiency of up to 97.4 percent. Alternatively, the UPS can operate in its voltage- and frequency-dependent (VFD) ECO mode to attain 99 percent efficiency.

When a UPS is operating significantly under capacity, its energy efficiency can be negatively impacted. ABB's Xtra VFI operating mode is a smart way to minimize losses and improve



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efficiency safely when running in double conversion mode.

When the MegaFlex DPA UPS runs with Xtra VFI mode enabled, the UPS automatically adjusts the number of active modules according to the load power requirements. Modules that are not needed are switched to a standby state of readiness, primed to transfer back to active mode if the load increases. The efficiency improvements

To increase reliability, extend service life and equalize aging, the system rotates modules between active and standby mode.

achieved by this mode of operation are especially significant when the load is less than 25 percent of full UPS system capacity – an operating regime in which traditional UPS systems fare poorly. The switching scheme parameters can be configured by the user. To increase reliability, extend service life and equalize aging, the system rotates modules between active and standby mode at fixed intervals. Should there be a mains failure or other

abnormal situation, all modules revert to active mode within milliseconds.

Control and monitoring

The MegaFlex DPA human-machine interface (HMI) allows the operator to display measurements, events and alarms (primary input failure, battery status, overtemperature, overload, input and output protection status, etc.) as well as the UPS status and primary component status →04.

Also measured and displayed are:

- Input, output and battery voltage and currents.
- Output kW/kVA.
- Thermal monitoring for the main converter and critical components.

Connectivity is accomplished via two slots for optional communication boards, eg, SNMP, Modbus TCP/IP or Modbus RS-485. These ports can make measurements and alarms available to the electrical power monitoring system (EPMS), the building management system (BMS) and the data center infrastructure management (DCIM) – all of which integrate with ABB Ability™ Data Center Automation via, for example, the local area network (LAN) →05. The UPS is also equipped with dry inputs for remote shutdown, generator operation and external switchgear; I/O dry ports; a Castell interlock function; and a preconfigured (battery) temperature sensor input.

Resiliency

Resiliency refers to the ability of the entire power structure to prevent failure – and to recover quickly and fully from failure – or to keep running even with a certain level of faulty equipment or software. A system-wide approach becomes essential if resiliency is to be maintained as the concept of the standalone data center is overtaken by new trends – for example, hybrid and distributed architectures and advances in virtualization; strategies that shift data from one geographical location to another to take advantage of cheaper energy tariffs; and real-time data replication in different sites for hyper-critical applications.

ABB's MegaFlex DPA UPS and associated ABB support infrastructure – such as intelligent switchgear, smart sensors, cloud-based predictive maintenance algorithms, enterprise-wide and site-specific monitoring, transformers, smart sensors, short-circuit isolation selectivity, etc. – help deliver the high level of system-wide resiliency needed.

Measures taken to improve resiliency can also have other benefits. For example, a good monitoring strategy creates a predictive insight that not only flags a component replacement need (rather than unnecessarily replacing it after a prescribed period) but also increases availability while reducing energy consumption. Here, emergency maintenance is also reduced and customer satisfaction increased. This approach also allows remote monitoring of energy consumption and costs, making the implementation of energy management strategies easier and faster.

Another critical aspect of resilience lies with ease of maintenance and the elimination of human error. The design of the MegaFlex DPA UPS has placed great emphasis on these factors. For example, module cabinets can be easily moved to the UPS location using a pallet truck and then slid into place on their integrated wheels →06. Connection is made via docking connectors so cabling faults cannot arise during the procedure.

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A predictive insight flags component replacement need, thus increasing availability while reducing energy consumption.

For mains cabling, there is entry top and bottom and the cabinet is IP20 protected. Further, the fan array is located on a pull-out drawer for easy access. Fan failure detection and speed regulation are provided as standard. Timely indication is given of the need to replace consumables such as fans and AC and DC filters, thus improving reliability. All in all, continuous UPS monitoring, smart design and intelligent diagnostics lengthen the UPS lifetime significantly.

MegaFlex DPA – a UPS for tomorrow's data center

High power, simplicity of use, efficiency, reliability, availability and resiliency are the watchwords that underpin ABB's high-power MegaFlex DPA UPS. MegaFlex DPA is designed to work with the rest of ABB's power infrastructure products to ensure a continuous flow of clean power to a data center and provide the system-wide resiliency needed for modern data storage solutions that implement distributed, cloud or hybrid approaches. By paralleling units, MegaFlex DPA can provide up to 6 MW and the UPS satisfies the "six-nines" requirement of the most demanding data centers.

Most important of all, MegaFlex DPA provides peace of mind for customers with the assurance that their power is guaranteed by the very best power protection technology on the market. •

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05 Example of Megaflex DPA connectivity.

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06 The Megaflex DPA. Power modules slide in on integrated wheels and lock in place using docking connectors.

